

R & D STATUS REPORT

ARPA ORDER NO.: A476

PROGRAM CODE NO.: N00014

CONTRACTOR: Radiant Technologies, Inc.

CONTRACT NO.: N00014-93-C-0218

CONTRACT AMOUNT: \$475,754.00

EFFECTIVE DATE OF CONTRACT: 8/12/93

EXPIRATION DATE OF CONTRACT: 4/30/95

PRINCIPAL INVESTIGATOR: Joseph T. Evans, Jr.

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SHORT TITLE OF WORK: Characterization of the Ferroelectric Imprinting Mechanism

REPORTING PERIOD 5/17/94 THROUGH 8/16/94

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DESCRIPTION OF PROGRESS:

Significant work was accomplished in three sections of the Category 1 test plan: PASSIVATE, FATIGUE, and COMPOSITION.

Die from wafer lot RT70 were used to execute the PASSIVATE test. This test is designed to compare imprint rates for capacitors with and without the glass passivation coating. A total of 256 devices, evenly split between passivated and unpassivated, were tested with the same procedure used in the CORRELATE test.

Software for data acquisition and control in the Temperature Controlled Automated Test System was completed and its function was verified. This system will perform tests in parallel on four packages each containing 16 or 24 capacitors. Packages are mounted in a temperature shock chamber that is remotely programmable to operate from -55°C to 200°C. The four data acquisition channels can each be programmed to do a variety of ferroelectric capacitor tests including hysteresis response, pulse polarization response, fatigue, and retention. The controller can also be programmed to direct any desired sequence of ferroelectric response tests and temperature stress periods. All Category 2 and the remaining Category 1 tests (FATIGUE and COMPOSITION) will be carried out using this facility.

The initial FATIGUE matrix runs were executed using packaged devices from wafer lot RT74. No degradation of capacitor function was observed as a result of the packaging process. Thus far over 1024 capacitors are tested, preliminary analysis of the results is in progress. The procedure used is to first fatigue the capacitors with 10kHz polarization switching at room temperature, then pole them in one direction during temperature stress ranging from -55°C to +200°C. The pre-fatigue periods are from zero to 3000 seconds long. This procedure determines the effect that capacitor fatigue state has on subsequent imprint behavior. The condition matrix for these runs also includes four different poling voltage amplitudes along with two combinations of poling direction and retention measurement polarity during temperature stress periods.

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Approved for public release;
Distribution Unlimited

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Fabrication of wafer lots MP3 and MP4 is being completed. The ferroelectric compositions in these lots are PLZT 0/40/60 and 3/40/60, respectively. These will be screened, diced, and packaged for use in the COMPOSITION portion of the Category 1 test matrix. When these lots are completed half of the planned experiments in the COMPOSITION test will be accomplished.

CHANGES IN KEY PERSONNEL:

No personnel changes were made.

SUBSTANTIVE INFORMATION FROM SPECIAL EVENTS:

None.

PROBLEMS ENCOUNTERED AND/OR ANTICIPATED:

The contract effort is still behind schedule because of the wafer lot fabrication problems encountered during the period from January through April. No new significant delays have occurred since that time.

ACTION REQUIRED BY THE GOVERNMENT:

None.

Accession For	
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Unannounced <input type="checkbox"/>	
Justification <i>per ltr</i>	
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FISCAL STATUS:

	<u>COST</u>	<u>FEE</u>
Amount currently provided on contract:	\$ 276,749.98	\$13,775.35
Expenditures and commitments to date:	\$278,837.89	\$13,912.32
Funds required to complete work:	\$179,668.11	\$3,335.68

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